

Purpose of Horizontal Test Stands

Horizontal test stands (HTS) provide the opportunity to test superconducting RF cavities under conditions similar to those in an accelerator. Individual cavities, welded inside their helium vessels and fully "dressed" with tuners/couplers/etc., are cooled down to superconducting temperatures and operated with high-power RF pulses in order to confirm that the desired cavity performance can be achieved. The canonical figures of merit are the accelerating gradient E_{acc} and intrinsic quality factor Q_0 .

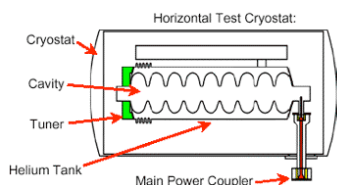


Figure 1: A dressed cavity in a horizontal test stand.

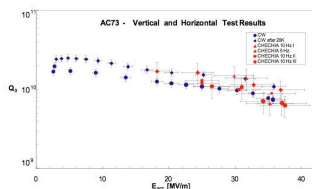


Figure 2: Results from a cavity test in a horizontal test stand (CHECKIA at DESY's TTF).

The ILCTA_MDB Horizontal Cryostat

Fermilab has designed a cryostat for the horizontal test stand in the Meson Detector Building (ILCTA_MDB) based on the DESY cryostat. Improvements on the DESY design include double-sided access and additional space for cavity dark current measurements.

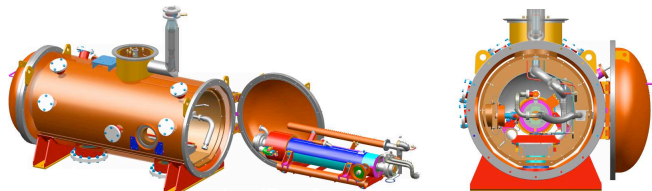


Figure 3: The cryostat designed by Fermilab in which cavities will be cooled down and tested.



Figure 4: The cryostat under construction at PHPK Technologies, Inc. in Columbus, OH. Shown are the outer shell (left) and an inner thermal shield (right).

RF and Cryo at ILCTA_MDB

Much of the cryogenic and RF infrastructure needed for the HTS already exists at ILCTA_MDB. It has been used to power Capture Cavity 2 (see poster by T. Koeth) to 28 MV/m at 4.5 K.



Figure 5: The ILCTA_MDB HTS cave and RF hut.



Figure 6: The 1.3 GHz klystron in use at MDB.

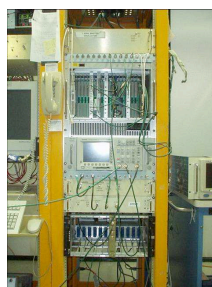


Figure 7: The low-level RF system in use at ILCTA_MDB.



Figure 8: The "feed can" constructed to supply 2 K superfluid helium to the ILCTA_MDB horizontal cryostat.

ILCTA_IB1

There is a proposal for a second horizontal test stand in IB1 at FNAL in order to increase cavity throughput. An idea under consideration for ILCTA_IB1 is to lengthen the cryostat in order to accommodate powering two cavities simultaneously.

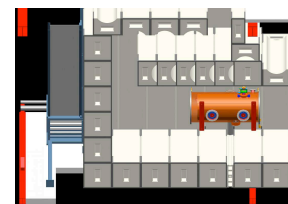
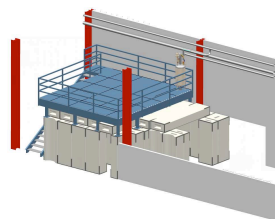


Figure 9: A proposed design for a horizontal test cave and cryostat in IB1.